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10-5-1953

## Test 508: Case 500

Nebraska Tractor Laboratory Submitted by Larsen Museum  
*University of Nebraska-Lincoln*

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The Experiment Station  
University of Nebraska College of Agriculture  
W. V. Lambert, Director, Lincoln, Nebraska

Department of Agricultural Engineering  
Dates of test: October 5 to October 10, 1953  
Manufacturer: J. I. CASE COMPANY, RACINE,  
WISCONSIN  
Manufacturer's rating: Not rated.

NEBRASKA TRACTOR TEST NO. 508

CASE MODEL 500

**BELT HORSEPOWER TESTS**

Hp	Crank shaft speed rpm	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
		Gal per hour	Hp-hr per gal	Lb per hp-hour		Cooling med	Air	
TESTS B & C—100% MAXIMUM LOAD—TWO HOURS								
63.81	1350	4.042	15.79	0.442	0.00	199	48	29.120
TEST D—RATED LOAD—ONE HOUR								
55.14	1350	3.439	16.03	0.436	0.00	199	55	29.130
TEST E—VARYING LOAD—TWO HOURS (20 minute runs; last line average)								
55.18	1350	3.432	16.08	0.434	...	198	54	.....
1.71	1470	0.996	1.72	4.070	...	181	53	.....
29.03	1416	2.220	13.08	0.534	...	198	55	.....
61.72	1298	3.943	15.65	0.446	...	198	55	.....
14.80	1439	1.611	9.19	0.760	...	197	58	.....
42.47	1383	2.787	15.24	0.458	...	200	56	.....
34.15	1392	2.498	13.67	0.511	0.00	195	55	29.133

**TORQUE (At Dynamometer)**

Eng rpm	1347	1272	1202	1120	1048	962	894	814	750	670
Lb-ft	379.9	388.9	398.1	404.4	411.3	406.9	403.4	402.0	385.9	383.3

**DRAWBAR HORSEPOWER TESTS**

Hp	Draw bar pull lb	Speed miles per hr	Crank shaft speed rpm	Slip of drive wheels %	Fuel Consumption			Water used gal per hour	Temp Deg F		Barometer inches of mercury
					Gal per hour	Hp-hr per gal	Lb per hp-hr		Cooling med	Air	
TESTS F & G—100% MAXIMUM LOAD—3rd Gear											
47.82	7409	2.42	1354	15.89	.....	Not Recorded	.....	186	66	29.000	
55.96	5762	3.64	1352	7.66	.....	Not Recorded	.....	195	68	28.970	
56.32	4252	4.98	1352	5.17	.....	Not Recorded	.....	199	68	29.000	
51.99	1827	10.67	1357	2.05	.....	Not Recorded	.....	190	69	28.980	
TEST H—RATED LOAD—TEN HOURS—3rd Gear											
44.24	3302	5.02	1350	4.00	3.086	14.34	0.487	0.00	195	71	28.958
TEST J—OPERATING MAXIMUM LOAD—3rd Gear											
54.61	4262	4.80	1353	8.10	.....	Not Recorded	.....	190	76	28.950	
TEST K—OPERATING MAXIMUM LOAD—3rd Gear											
51.19	4470	4.29	1356	14.57	.....	Not Recorded	.....	190	74	28.950	

**TIRES, WHEELS AND WEIGHT**

	Tests F, G & H	Test J	Test K
<b>Rear wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	1034 lb each	None	None
Added cast iron	700 lb each	None	None
<b>Rear tires</b>			
No. and size	Two 15-30	Two 15-30	Two 14-30
Ply	8	8	6
Air pressure	16 lb	12 lb	12 lb
<b>Front wheels</b>			
Type	Cast iron	Cast iron	Cast iron
Liquid ballast	None	None	None
Added cast iron	None	None	None
<b>Front tires</b>			
No. and size	Two 7.50-18	Two 7.50-18	Two 7.50-18
Ply	4	4	4
Air pressure	28 lb	28 lb	28 lb
<b>Height of drawbar</b>	17½ inches	17½ inches	16 inches
<b>Static weight</b>			
Rear end	8950 lb	5482 lb	5372 lb
Front end	2480 lb	2471 lb	2468 lb
<b>Total weight as tested with operator</b>	11,605 lb	8128 lb	8015 lb

**FUEL, OIL and TIME** Diesel Fuel cetane No 50 (rating taken from oil company's typical inspection data); weight per gallon 6.985 lb **OIL** SAE 20; to motor 2.940 gal; drained from motor 2.633 gal; Total time motor was operated 40½ hours.

**CHASSIS TYPE** Standard Serial No 8032765 Tread width rear 60¾" front 62" Wheel Base 88" Hydraulic control system driven by continuous running power take-off with independent clutch **Advertised speeds mph** first 2.69 second 3.70 third 4.91 fourth 10.10 reverse 2.94 **Belt pulley** diam 13" face 8¾" rpm 956 **Belt speed** 3254 fpm **Clutch** single plate wet disc operated by hand lever **Seat** pressed steel with sponge rubber cushion which can swing from side to side and tilt upward **Brakes** double disc on differential shaft operated by two foot pedals **Equalized** by locking brake pedals together **Power take-off** continuous running with independent clutch **Steering** aided by hydraulic power steering.

**ENGINE** Make J. I. Case Type 6 cylinder vertical Diesel Serial No 8032765 Crankshaft mounted lengthwise **Head I** Lubrication pressure **Bore and Stroke** 4" x 5" **Rated rpm** 1350 **Compression ratio** 15 to 1 **Displacement** 377 cu in **Port Diameter Valves** Inlet 1.375" Exhaust 1.219" **Governor** variable speed centrifugal **Starting System** two 6 volt batteries **Air Cleaner** oil washed wire mesh **Muffler** was used **Oil Filter** replaceable treated paper element **Fuel Filter** one fuel tank breather filter, one fine mesh filter screen, one fuel tank water trap, one edge wound metal filter removeable for cleaning, one filter with replaceable element and one replaceable sealed filter **Cooling medium temperature control** thermostat and shutter.

**REPAIRS AND ADJUSTMENTS:** No repairs or adjustments.

**REMARKS** All test results were determined from observed data and without allowances, additions or deductions. Tests B and F were made with fuel pump set to develop approximately 65 corrected maximum belt horsepower and data from these tests were used in determining the horsepower to be developed in tests D and H, respectively. Tests C, D, E, G, H, J & K were made with the same setting.

**HORSEPOWER SUMMARY**

	Draw-bar	Belt
1. Sea level (calculated) maximum horsepower (based on 60° F and 29.92" HG)	58.55	64.81
2. Observed maximum horsepower (tests F & B)	56.32	63.81
3. Seventy-five per cent of calculated maximum drawbar horsepower and eighty-five per cent of calculated maximum belt horsepower (formerly ASAE and SAE ratings)	43.91	55.09

We, the undersigned, certify that this is a true and correct report of official tractor test No. 508.

L. F. LARSEN  
Engineer-in-Charge

C. W. SMITH  
L. W. HURLBUT  
F. D. YUNG  
Board of Tractor  
Test Engineers

## EXPLANATION OF TEST REPORT

**TEST A:** The manufacturer's representative operates the tractor for a minimum of 12 hours using light to heavy drawbar loads in each gear.

This serves as a period for limber up, general observation and adjustments. Adjustments that are permissible include valve tappet clearance, breaker point gap, spark plug gaps, clutch and others of a similar nature. No new parts or accessories can be installed without having mention made of it in the report.

No data are recorded during this preliminary run except the time that the engine is operated.

### BELT HORSEPOWER TESTS

**TEST B:** The throttle valve is held wide open and the belt load on the dynamometer is adjusted so that the engine is at the rated speed recommended by the manufacturer. Carburetor, ignition timing and manifold adjustments are all set for maximum engine power.

This test is designed to determine maximum belt horsepower of the tractor at rated speed and to measure fuel consumption at the maximum power on the belt.

**TEST C:** For tractors with carburetors the best fuel economy does not always occur when the engine develops maximum power at rated speed. Test C is intended to allow the manufacturer's representative to select a more economical fuel setting even though there is a slight loss of power. *This more practical carburetor setting is used in all later tests except test F.* The throttle valve is held wide open and load adjusted to give rated rpm. Tests B and C are the same for diesel tractors, which have an altogether different fuel system.

**TEST D:** The throttle control lever is set so that the governor will maintain rated engine speed when rated load is applied. Rated load is 85% of 100% maximum, as obtained in test B, corrected to standard conditions.

This rating is somewhat less than the maximum belt horsepower in order that the operator may have a certain amount of reserve.

### TEST E:

**Varying load** serves to show the range of engine speeds when the engine is controlled by the governor during the following varied loads of 20 minutes each: rated load, no load,  $\frac{1}{2}$  rated load, maximum load at wide open throttle valve,  $\frac{1}{4}$  and  $\frac{3}{4}$  rated load.

The average result of this test shows the average power and fuel consumption. Since the average tractor is subjected to varying loads, these data serve well in predicting fuel consumption and efficiency of a tractor in general use.

**Torque, lb-ft at dynamometer,** is obtained with wide open throttle and sufficient load is applied to give several readings.

### DRAWBAR HORSEPOWER TESTS

In all drawbar tests the pull exerted by the tractor is transmitted by a hydraulic pressure cylinder to a recording instrument in the test car. All tests are made on the same dirt test course which is maintained by grading, sprinkling and rolling

so that it remains very nearly the same throughout the season. The same tires, wheels and weights are used for all tests except J and K.

**TEST F:** A drawbar test, the results of which are used to determine the rated drawbar horsepower in test H. The carburetor is set to develop maximum power as in test B. The rated gear recommended by manufacturer as plow gear is used in this test. The drawbar load is adjusted to give rated engine speed.

**TEST G:** Maximum drawbar horsepower is determined in each gear when the carburetor is set for fuel economy as in test C. The throttle valve is held wide open and the load is applied so that the engine runs at rated engine speed.

When operating in low gear it is not uncommon for the tractor to develop less drawbar horsepower than in rated gear because of excessive wheel slippage. When excessive wheel slippage occurs the load is reduced until slippage approaches 16%. When the load is reduced it is necessary to operate the tractor engine at part throttle and control engine speed by governor action.

**TEST H:** Intended to test the ability of the tractor to run continuously for 10 hours at rated drawbar horsepower and to determine the fuel consumption during that time. Rated drawbar horsepower is 75% of 100% maximum drawbar horsepower (Test F), corrected to standard conditions.

When operating at rated load the throttle control lever is set to maintain rated engine speed. This rating is less than maximum drawbar horsepower in order that the operator may have a certain amount of reserve.

**TEST J:** The tractor is operated in rated gear with all added weight removed. This test shows the effect of the removal of added weight on the performance of the tractor when compared with test G.

Removal of wheel weights generally increases wheel slippage and decreases drawbar horsepower.

**TEST K:** Similar to test J except that the smallest tires and lightest wheels offered by the manufacturer are used.

